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UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
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PSW FOREST AND RANGE EXPERIMENT STATION
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REPLY TO: 3430 Evaluation

DATE: October 10, 1984

SUBJECT: Red Fir Mortality Near Rock Creek, Kings River Ranger District (Report No. 84-40)

TO: Forest Supervisor, Sierra National Forest

Bob Evans, Planning Forester on the Kings River Ranger District, requested an evaluation of red fir mortality in the old Tiny Timber Sale area near Rock Creek. The apparent objective of the previous sale was to remove volume. The District was concerned about the effect that the current mortality would have on an upcoming sale scheduled for 1987. On August 24, 1984, Dave Schultz and Det Vogler from the Forest Pest Management Staff examined the area with Bob Evans.

OBSERVATIONS

The area examined had a scattered overstory of old-growth red fir and lodgepole pine. Dwarf mistletoe infections were common in both red fir (Arceuthobium abietinum f.sp. magnificae) and lodgepole pine (A. americanum). The understory was a dense stand of red fir and lodgepole pine seedlings, saplings, and small poles. Dwarf mistletoe had begun to infect some of the larger saplings and small poles. The area was nearly level, had a ground cover of grass, and appeared to be usually quite wet. Several seedlings were excavated and found to have shallow root systems.

There were dead red fir of all size classes in the stand. Seedlings and saplings generally showed evidence of attack by a small secondary bark beetle, Pityokteines elegans. Large saplings and poles had been both unsuccessfully and successfully attacked by the fir engraver, Scolytus ventralis. The dead overstory red fir contained the fir engraver and the fir roundheaded borer, Tetropium abietis. A few overstory lodgepole pine had recent pitch tubes from the mountain pine beetle, Dendroctonus ponderosae, but none appeared to have been successful.

DISCUSSION

The recent mortality seems to be the result of a fluctuating water table affecting a stand already stressed by overstocking and dwarf mistletoe. The water table appeared to be normally high in the area, and some of the seedlings had developed small, shallow root systems. From October 1, 1982 through September 30, 1983, nearby weather stations recorded 240 percent of normal precipitation, with 51.20 inches received from January through June of 1983. This probably caused the soil to be saturated for at least part of the 1983 growing season. A lack of root aeration as well as other stresses was enough to allow successful attacks by the fir engraver and fir roundheaded borer on the overstory red fir during 1983. From January through June of 1984, only 11.90 inches of precipitation was received at nearby weather stations which apparently reduced the availability of moisture to seedlings enough that Pityokteines elegans, a beetle which normally breeds in dying material, was able to successfully attack them.

Some additional red fir trees will probably die in 1985 because they have been attacked, but have not faded yet. In most cases it will be impossible to identify these trees in advance because there are few outward signs of attack. Mortality should decrease after soil moisture conditions return to normal. Given the scattered nature of the overstory, however, it is possible that further mortality of trees already infested, but not yet faded could reduce the volume per acre to the point that a green sale might not be economical.

If salvage of the dead trees is going to occur during 1984, there may be several advantages to including much of the overstory red fir. A single sale would probably be more efficient than a series of smaller sales that remove the trees as they die. Also, returns to the Treasury would be maximized if trees were removed while green and, if the sale was large enough, KV funds could be collected to thin the understory and selectively remove trees that are severely infected with dwarf mistletoe.

MANAGEMENT ALTERNATIVES

1. **Continue current management.** This alternative assumes that current mortality will be captured in a salvage sale and that a green sale will be planned for 1987. Some additional red fir overstory trees will fade in 1985 because they are already infested. Mortality should be lower after soil moisture returns to normal, although above- or below-normal precipitation in the future could cause high mortality levels again. If the understory is not treated, the stand will grow slowly due to dense stocking and dwarf mistletoe infection, and will probably resemble the current stand before the end of the rotation.

2. **Clear-cut current stand and replant**. Clearcutting the current stand and replanting offer the advantages of suppressing dwarf mistletoe and gaining greater control over the density and species composition of the regeneration. The scattered nature and low species value of the current timber may make it difficult to cover the costs of site preparation, planting, and release. If the site were completely cleared, the water table would probably rise dramatically and make plantation establishment nearly impossible.

3. **Remove overstory**. Removal of the overstory would stop continual reinfection of the understory by dwarf mistletoe, release the understory, and make a return to the Treasury. The current understory is dense enough that the water table should not rise greatly.

4. **Remove overstory, thin and sanitize understory**. Thinning should increase the growth and vigor of the understory. This will make the trees less susceptible to attack by twig and engraver beetles, and should allow slightly-to-moderately infected red fir to outgrow the vertical spread of the dwarf mistletoe. Understory trees that are severely infected with mistletoe or that have been wounded during overstory removal should be removed during thinning.

If you have questions about the evaluation, please call Dave Schultz or Det Vogler at 415-556-6520.

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